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The Credit Rating Market - Options for Appropriate Regulation

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Abstract

The principal agent problem is one of the major issues of the credit rating agency market. Is it possible to solve the prevailing incentive problem of the market and contemporaneously satisfy the reputation demand of the investors? This paper presents an option for regulating the credit rating agency market more effectively. The market shall be coordinated through a central allocation office, which is acting as a mediator between both contractual parties. The paper develops a game theoretical approach that considers reputation as one of the most important aspects within the market. After analysing the status quo two policy options are discussed on a game theoretical basis. The main result is that the incorporation of a mediator, which awards the contracts based on a lottery drawing, would help to solve conflicts of interests. The incentive to inflate ratings decreases significantly. Moreover, rating shopping option becomes impossible. Two possible positive side effects for smaller CRAs and new incumbents are the increase of market share as well as reputation. Therefore, the market competition should be affected positively, too.

JEL Classification: G24, G28, D43, D82
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I. Introduction

Credit Rating Agencies (CRAs) have been in the focus of the public and of regulators within Europe since the world-wide financial and economic crisis started in 2007. CRAs are said to be a trigger of the financial crisis owing to their ratings for securitisations. Moreover, the inertia of CRAs regarding rating adjustments, as seen for example in the case of Lehmann Brothers or some European Countries, even increases the existing criticism. The erroneous developments, incentives or the insufficient liability have been focal points in the literature for a long time.

Since 2009, the European Commission has tried to overcome the weaknesses of the market by suggesting and implementing changes in the regulatory framework within which the CRAs work. Finally, the European Commission has revised the regulatory framework in November 2011 as it realised shortcomings and because during the European debt crisis, emerging in 2010, politicians often criticised that Europe is strongly dependent and influenced by the 'big three' (Moody's, S&P and Fitch, the trio).

The focus of this paper is laid upon regulatory policy. Initially, we present policy trends of 2011 within the European Union. Although, in our opinion, the reform proposal of the European Commission is rather inappropriate to solve the existing problems of the market it may be a step in a right direction. The proposal is concentrating on transparency, the principal agent problem, inappropriate liability, the inertia of CRAs, among others. The issue of conflict of interests, however, arising from the business model remains unaddressed.

Some authors argue that an increase in market competition simultaneously raises the incentives to inflate the credit ratings (see for example Bolton et al. 2012, Camanho et al. 2011). For this reason the paper considers three game theoretical approaches in order to investigate the current market situation as well as two options for market regulation afterwards. The paper intends to demonstrate that rating honestly is a Nash equilibrium. It cannot be excluded finally, however, that in some cases a second equilibrium occurs (namely to rate inflationary). Based on the theoretical results, we will discuss the status quo and an alternative option based on a central allocation office, which is acting as a mediator between both contractual parties. The mediator is also assumed to be responsible for awarding the contracts based on a lottery drawing. To increase the incentives to work accurately it seems to be advantageous that CRAs with higher reputation obtain a higher probability to get drawn. Although basically the 'issuer-pays' model still exists, the framework seems to be appropriate to solve the conflict of interests. Furthermore, the framework could enable smaller CRAs or new incumbents to increase their reputation as well as their market share. Therefore, this option may also help to increase market competition, at least indirectly.

The remainder of this paper is organised as follows: in section 2 the paper provides an overview about the literature. Next, recent developments of regulatory framework within Europe will be discussed (section 3). In section 4, a game theoretical investigation as well as a discussion of the results follow. Based on the theoretical results a detailed description of a reform option is provided in section 5. Section 6 concludes the paper.

II. Literature Review

The literature on rating agencies follows three main avenues. It first approaches the issue in complex theoretical models addressing the question of how competition is affecting the efficient outcome of the rating process. Using mainly game theoretical models, models of monopoly or duopoly are analysed. Two aspects of quality are of interests: honest rating on the supply side and rating shopping on the demand side of rating markets. In an evolutionary game, Hirth (2012) analyses the effects of increasing competition on honest rating. Indeed, more competition, i.e. the move from one to two suppliers, increases the likelihood of honest rating. Similarly, Hörner (2001) shows that increasing competition raises

the value of reputation. This holds in particular, if information is asymmetrically distributed between the market sides. Doherty et al. (2009) argue that market entry of a second supplier increases rating standards.[1]

However, other authors are less optimistic with respect to the efficiency of higher competition. Mathis et al. (2009) argue that those firms earning the lion's share of their income rating complex products do not benefit from reputation. According to Skreta and Veldkamp (2009) and Camanho et al. (2011) competition increases rating shopping and decreases honest rating, respectively. Bolton et al. (2012) add the investors' perspective and show in their model that competition is likely to reduce market efficiency. By the same token, the occurrence of an investment boom contributes to inflationary ratings. Faure-Grimaud and Quesada (2009) show that competition reduces the willingness of issuers to publish unfortunate ratings.

The second group within the literature comprises empirical papers, which results of course are limited by the fact that there is an oligopoly in the market. Most papers, in addition, deal with sovereign bonds risk, which we do not consider here. The results are mainly indicating that competition is not increasing rating standards. Bongaerts et al. (2012) show that in case of a tie-break the third opinion has a tendency to the better. Becker and Milbourn (2011) show that higher competition induces inflationary ratings, whereas Jewell and Livingston (1999) come to the conclusion that competition increases rating shopping. According to He et al. (2011), large issuers get better ratings than smaller issuers. A different opinion is held by Covitz and Harrison (2003), who argue that conflict of interest is less important than reputation, thus there is a tendency to increase the quality with rising competition.

The third strand of the literature is dealing with normative conclusions towards better regulation of rating agencies. White (2010a,b) suggests to reduce the legal requirements for investors to consider ratings in their decisions. Investors should take more responsibility; the moral hazard problem should decrease. Partnoy (2006, 2009) sees a lack of liability on the side of the rating agencies; were they liable, honesty would increase, so his argument. In some papers, the 'issuer-pays' model is criticized (e.g. Mathis et al., 2009).[2] Before, we develop our theoretical analysis based on and informed by this literature (and its omissions), we briefly introduce the lessons the European Commission has drawn from the crisis.

[1] One paper analyses the role of single analysts and their incentives to change the job and go to an issuer (Bar-Isaac and Shapiro, 2011). Interestingly such a move may reduce the rating quality.

[2] It is also worth noting that after 2006, the general assessment of CRAs has become much more negative than before.

III. Policy Trends since 2011 - Proposal of the European Commission

Despite the critical views expressed in the literature, CRAs are necessary to overcome information asymmetry. They are perceived to be important financial market participants, as their ratings affect the behaviour of issuers as well as investors. The resulting market power, however, is significant and sometimes disadvantageous. With the beginning of the financial crisis but particularly in the course of the European sovereign debt crisis public criticism of structure and power of CRAs grew intensively. Therefore, the European Commission already changed the European legislation on CRAs in 2009 and 2010. The adopted regulations, however, have not been expedient and thus the European Commission issued a far-reaching reform proposal on November 15, 2011. We provide a number of proposal details, without evaluating the issue in depth. Initially, the European Commission is willing to address the principal agent problem, however, without rethinking the 'issuer-pays' business model of the CRAs. Rather the reform approach provides two key aspects - rotation principle and the increase of independence. The rotation principle provides that a CRA is only allowed to have a contractual relationship of maximum three consecutive years to one issuer (European Commission, 2011, Article 6b).[3] The main target is to address the above-mentioned problems as discussed by Bolton et al. (2012) and Faltin-Traeger (2009). Moreover, the European Commission plans to disentangle the conflict of interests resulting from the possibility when the issuer may be contemporaneously a shareholder of a CRA.

The European Commission proposes the adoption of two main regulations. First, it is discussed that one shareholder must not hold five per cent or more voting rights of more than one CRA (European Commission, 2011, Article 6a). Second, for shareholders a prohibition to distribute products, which have been rated by the 'own' CRA, should be introduced. Another major concern about the rating market is that CRAs are "largely immune to civil and criminal liability for malfeasance" (Partnoy, 2006, p. 61). CRAs indeed argue that their primary business focus revolves around the provision of economic journalism and, therefore, the issued ratings are expressions of opinions. Notwithstanding the European Commission (2011) adopts a proposal for a civil liability article (Article 35a), which would enable investors to take action against CRAs if the rating contains intentionally or grossly negligent mistakes. In order to help investors to proof malfeasance it is proposed to reverse the burden of proof (Article 35a(4)).

Another point of criticism of the public and the regulators is the inertia of CRAs. Enron (2001), Worldcom (2002), Lehman Brothers (2008) and the re-evaluation

[3]The European Commission also considers the case if one issuer has contractual relationships to two CRAs. In this case the described maximum contract duration is only applicable for one CRA. The contractual relationship to the other CRA, however, is not allowed to exceed six consecutive years.

of some European countries (e.g. Greece) within the current European sovereign debt crisis are only a few examples where the adjustment of the ratings were characterised by inertia.[4] The European Commission especially wants to confront the large time lag in changes of sovereign ratings due to the systematic risks, which can arise if a CRA downgrades the creditworthiness of a country spontaneously. Therefore, the review period shall be shortened from 12 to six months (Article 8(5)). The final proposal detail that is addressed within this paper is strongly connected to Skreta and Veldkamp (2009). They argue that rating quality can be influenced adversely by the lack of sophisticated investors. The European Commission adopted a regulation that obliges financial institutions (credit institutions, investment companies, insurance firms, among others) to generate their own credit risk assessments in order to make them more sophisticated.[5]

Although the European Commission's reform proposal is facing some important aspects the approach seems rather inappropriate for the solution of the more significant problems, which are market power of oligopolists, imperfectly working competition, principal agent problem and reputation being a key characteristic of the market.[6] To address these problems, the paper discusses two main questions.
1.) Is it possible and reasonable to disperse the market power of the three big market participants. If so, how?
2.) Is it possible to solve the prevailing incentive problem of the market and contemporaneously satisfy the reputation demand of the investors?

IV. Game Theoretical Model - Strategic Interaction and Payoffs

This section is dedicated to our theoretical analyses, which is informed by the literature as well as the European Commission's proposal. It discusses different policy frameworks in a simple game theoretical model. Each approach we consider is defined by divergent market regulations. All models are based Bolton et al. (2012) and Hirth (2012). The following games are characterised as one-shot games where all players move simultaneously and thus these are games of imperfect information. Moreover, the games are defined by common knowledge.

[4]To name two examples in more detail, in November 2001 "the three major rating agencies had maintained 'investment grade' ratings on Enron's bonds until five days before that company declared bankruptcy" and in September 2008 "the major rating agencies still had 'investment grade' ratings on Lehman Brothers' commercial paper on the morning that Lehman declared bankruptcy (...)" (White, 2010b, p. 218).

[5]CRAs do not become redundant due to this reform proposal. The main focus of the proposed approach is to make financial institutions more independent. In general, CRAs are still important to support investors, particularly less sophisticated, to overcome the issue of information asymmetry.

[6]In general, we would argue to establish the market reform proposal globally. This is as credit rating can generate significant international spillover effects. An international reform agreement, however, seems to be rather unrealistic.

That means that all CRAs have symmetric information and therefore no CRA has an informational advantage (Rasmusen, 2009).

Consider a market consisting of two main agents - CRAs and investors. There are, however, also issuers and regulators, which are not modelled in detail. All actors are risk neutral. Also assume that an issuer wants to issue an investment. There are two different types of investments. On the one hand there are good investments. These investments are characterised by having a probability of default of zero ($p = 0$) and generating a net return $R > 0$. On the other hand, bad investments can generate the same net return as good investments, as long as the investment does not default. The probability of default for bad investments, nonetheless, is $p > 0$, because of which the expected net payoff is smaller than in the case of a good investment. Moreover, an investment is randomly good with the probability of $0 < \lambda < 1$.

IV.1. Status Quo Analysis

Under the regulatory status quo, no regulation exists that prescribes which CRA an issuer has to choose. In fact, each issuer is able to decide individually. Owing to its contractual relationship with the issuer, the CRA is obliged to rate the investment. The commissioned CRA is paid a rating fee (ϕ) by the issuer. Similar to Bolton et al. (2012) and Hirth (2012), we assume that a CRA only receives the fee for a good rating ($\phi_G \geq 0$). The CRA receives no fee-payment in cases when the credit rating is bad ($\phi_B = 0$).[7] This assumption enables to model rating shopping in a reduced-form (Bolton et al., 2012 and Hirth, 2012). As long as the issuer receives a negative rating grade it is possible to commission another CRA. Moreover, it is assumed that the investors perceive an investment without any rating as bad (similar to Hirth, 2012). It thus can be argued that a credit rating has a positive impact for issuers.

The CRA in charge obtains a perfect signal (s) from the issuer. In cases when the investment is good, the CRA obtains $s = g$, whereas in an alternative scenario the signal is $s = b$. A CRA has two different actions to choose. On the one hand, the CRA can choose the strategy 'honesty' and thus works carefully. Therefore, the CRA evaluates a good investment (g) with the grade G (good) and the opposite investment with B (bad). In other words, the CRA is telling the truth. On the other hand, the CRA can work opportunistically and inflates a rating in cases when it receives a signal $s = b$ but publishes the rating grade G.[8]

[7] This assumption follows Bolton et al. (2012) who cite a report of the SEC (2008, p. 9): "Typically, the rating agency is paid only if the credit rating is issued, though sometimes it receives a break up fee for the analytic work undertaken even if the credit rating is not issued."

[8] An alternative scenario, in which a CRA works negligent, i.e. that a good investment receives

After the CRA published the rating of an investment investors retain the possibility to buy an investment. Investors who participate in the market process, however, may have different qualities. In line with the research of Bolton et al. (2012) as well as Hirth (2012) it is assumed that investors can be divided into two different groups. At one extreme, there are naive or trusting investors with a share of $0 < \alpha < 1$ and, at the other extreme, there might be sophisticated investors $(1 - \alpha)$. In this paper it is assumed that naive investors are not capable to estimate whether a CRA is working carefully or negligent. The reason for this inability might be a lack of resources (time, capital) needed to evaluate the work of CRAs. Therefore, less informed investors are trusting and reward a qualitative good rating with a reputation premium only in cases the investment does not default. Sophisticated investors, on the other hand, can be assumed as professional market participants, such as banks, insurance companies, investment firms, pension funds. It is assumed that these investors are able to assess immediately whether a CRA is working correctly. This ability, however, is cost intensive and thus investors spend costs in shape of $C > 0$.[9] Therefore, sophisticated investors are only willing to reward qualitative good ratings independent of the default of an investment.

As indicated above, both sophisticated and trusting investors reward CRAs for qualitative appropriate ratings, however, there are differences between these groups. Therefore, we assume in this paper that the reputation premium ρ can be divided into two parts. There exists a reputation premium τ $(\tau \geq 0)$ belonging to trusting investors, whereas the reputation premium of sophisticated investors is given by σ $(\sigma \geq 0)$. Thus, the whole reputation premium is defined as

$$\rho = \alpha \cdot \tau + (1 - \alpha) \cdot \sigma. \tag{1}$$

As pointed out previously, reputation is assumed to be an incentive for CRAs to provide qualitative good work and tell the truth, respectively. Therefore, due to the reputation premium the investors are able to punish failures of the CRAs because every negative deviation from the maximum reputation premium ρ is synonymous with reputation costs. Reputation costs can be assumed as the loss of discounted sum of future CRA profits.

Now we are considering the payoffs of CRAs.[10] If the commissioned CRA decides

a negative rating grade, is not considered, because a CRA is only paid for good ratings (Hirth, 2012).

[9] According to Hirth (2012) the assumption that sophisticated investors recognise and punish inflating CRAs immediately is strong. "However, the assumption is consistent with the previous assumption that investments turn out to be good or bad (without any uncertainty due to overlapping realizations of the outcomes) immediately after making the investment decision" (Hirth, 2012, p. 9).

[10] Due to the fact that the main focus of this paper lies on CRAs and their payoffs we are not

to rate honestly, it only evaluates good investments as good. It receives fees and the reputation premium only for good investments, which occurs with a probability λ. In cases a CRA rates a bad investment honestly, the rating will not be published and the issuer commissions another CRA. Therefore, the CRA in charge receives no payment and is not able to obtain the reputation premium. The payoffs against trusting (X_{HT}) and sophisticated (X_{HS}) investors are

$$X_{HT} = \lambda \cdot (\phi_G + \tau) \tag{2}$$

$$X_{HS} = \lambda \cdot (\phi_G + \sigma). \tag{3}$$

Consequently, the resulting expected payoff for the CRA in charge is

$$\Pi_H = \lambda \cdot (\phi_G + \alpha\tau + (1 - \alpha) \cdot \sigma). \tag{4}$$

On the other hand, a CRA can decide to inflate ratings. Therefore, the CRA always issues good ratings independent of the investment's quality. If the CRA is meeting trusting investors they receive

$$X_{IT} = \lambda \cdot (\phi_G + \tau) + (1 - \lambda) \cdot [\phi_G + (1 - p)\tau]. \tag{5}$$

The CRA always receives the fee payment (ϕ_G). Moreover, the CRA can obtain a reputation premium. However, whether the CRA is punished for rating inflation depends on the default of the bad investment. Sophisticated investors identify the rating inflation immediately and punish the CRA. Therefore, if the CRA is meeting sophisticated investors they receive

$$X_{IS} = \phi_G + \lambda\sigma. \tag{6}$$

The resulting expected payoff for a CRA that is choosing the inflating strategy is

$$\Pi_I = \phi_G + \alpha \cdot (1 - p + \lambda p)\tau + (1 - \alpha) \cdot \lambda\sigma. \tag{7}$$

All payoffs for the CRA are summarized in the following table:

discussing the payoffs of the investors. For more detail see Hirth (2012) as well as Bolton et al. (2012).

Table 1: Status Quo - Two-Player Game in Normal Form

CRA / **Investors**	**honest**	**inflating**
trusting	$\lambda \cdot (\phi_G + \tau)$	$\lambda \cdot (\phi_G + \tau)$
	...	$+(1-\lambda) \cdot [\phi_G + (1-p)\tau]$
		...
sophisticated	$\lambda \cdot (\phi_G + \sigma)$	$\phi_G + \lambda\sigma$
	...	...
expected	$\lambda \cdot (\phi_G + \alpha\tau + (1-\alpha) \cdot \sigma)$	$\phi_G + \alpha \cdot (1 - p + \lambda p)\tau + (1-\alpha) \cdot \lambda\sigma$

Although the description of the status quo is shortened[11] and defined as a one-shot game, the main results are reasonable. On the one hand, for honest CRAs it is impossible to generate the complete market reputation. This is because an issuer is allowed to decide individually whether to publish a bad rating or to commission another CRA that would evaluate the issuer another time (rating shopping). Owing to the 'issuer-pays' business model in connection to the principal agent problem it can be rational, on the other hand, to inflate bad investments.

IV.2. Random Rating Allocation to one CRA

The game theoretical analysis of the status quo demonstrates that two main issues of the credit rating market are rating inflation and rating shopping. Next we ask the question of whether a randomisation would be helpful to overcome these problems. For this purpose, we are assuming the establishment of a mediator (or central allocation office). The mediator shall prevent direct contractual relationships between the issuer and the CRA in charge.

Imagine a pool of accredited CRAs able to rate the issuer adequately. The central allocation agency draws randomly and anonymously a CRA that receives the order to rate the issuer or its products. The evaluation of the CRA will be issued, independent of the final outcome. Therefore, it becomes impossible for the issuer to choose the rating shopping alternative when the issuer's investment is evaluated negatively. Owing to the fact that the rating report is issued definitely, the CRA receives the fee-payment ($\phi > 0$) certainly. As already discussed above, the CRA in charge has two possible actions to choose - honest and negligent/inflating[12].

To start, we are considering the payoffs of a CRA selecting to act honestly. Owing to the changed payment structure an honest CRA receives fees for both

[11] For a detailed analysis of the status quo it is referred to Bolton et al. (2012) as well as Hirth (2012).

[12] Due to the varied payment structure it is possible that the CRA evaluates a good investment as bad. In this case the CRA would rate negligent than rather inflating.

good ($m = G$) and bad ($m = B$) rating reports. Moreover, the CRA is able to gain earnings of the discounted sum of future CRA profits. As mentioned above, sophisticated investors have the ability to evaluate the CRA report immediately after publication. Trusting investors are not capable to evaluate the CRA report. The quality of their evaluation is dependent on whether the investment defaults or not. Therefore, we assume that if a single CRA reports $m = B$ and the investment does not default, the CRA is punished by trusting investors. This is because a single CRA cannot convey credibly that they rated correctly. The payoffs of a CRA meeting trusting (X_{HT}) and sophisticated (X_{HS}) investors, respectively, are

$$X_{HT} = \lambda \cdot (\phi + \tau) + (1 - \lambda) \cdot (\phi + p\tau) = \phi + (\lambda + p - \lambda p) \cdot \tau \tag{8}$$

$$X_{HS} = \phi + \sigma. \tag{9}$$

The resulting expected payoff for a CRA that acts honestly is

$$\Pi_H = \phi + (1 - \alpha)\sigma + \alpha \cdot (\lambda + p - \lambda p)\tau. \tag{10}$$

Furthermore, a CRA can decide to rate negligently and inflate ratings, respectively. In other words, the CRA is not reporting the received signal. As mentioned above, if a CRA is meeting sophisticated investors they will discover the misjudgement. Therefore, the CRA is punished and receives only the fees. The punishment by the naive investors is depending on two facts: First, a good investment obtains a bad rating. Therefore, a negligent CRA is punished due to the fact that good investments never default ($p = 0$). Second, if an investment is bad the punishment depends on the default. A CRA incurs reputation costs only in cases when the bad investment, which is rated as good, defaults (with a probability of p). While with the complementary probability no default occurs and the CRA earns τ. Thus the CRA earns

$$X_{IT} = \phi + (1 - \lambda) \cdot (1 - p)\tau \tag{11}$$

$$X_{IS} = \phi. \tag{12}$$

Consequently, the resulting expected payoff for the CRA is

$$\Pi_I = \phi + \alpha \cdot (1 - \lambda)(1 - p)\tau. \tag{13}$$

All payoffs for the CRA are summarized in the following table:

Table 2: Random Rating Allocation to one CRA - Two-Player Game in Normal Form

CRA / **Investors**	**honest**	**inflating**
trusting	$\phi + (\lambda + p - \lambda p)\tau$	$\phi + (1-\lambda)\cdot(1-p)\tau$
	...	...
sophisticated	$\phi + \sigma$	ϕ
	...	...
expected	$\phi + (1-\alpha)\sigma + \alpha\cdot(\lambda + p - \lambda p)\tau$	$\phi + \alpha\cdot(1-\lambda)(1-p)\tau$

The random rating allocation process, where the mediator draws one CRA, has shown itself useful to solve the problem of rating shopping. Moreover, it could reduces the probability of inflating significantly. Thus, due to the randomisation the incentive structure improved. However, the incentive to inflate ratings depends significantly on two variables. It increases with the share of trusting investors and decreases with the probability of default of the bad investment. There is one major criticism: the mediator is only drawing one CRA. Owing to this framework the drawn CRA achieves a 'sequential' monopolistic position. For this reason trusting investors cannot be protected expediently because this approach permitted no second opinion.

IV.3. Random Rating Allocation to two CRAs

After discussing the random rating allocation to one CRA on a game theoretical basis, we now consider the case when two CRAs are randomly drawn. Similarly to the scenario above, the mediator draws randomly and anonymously two different CRAs that receive the order to rate the issuer or its products. Therefore, one can argue that the resulting covered game is determined exogenously. The rules of the game remain unchanged. Each CRA has the ability to select between two actions. The decisions of CRAs are taken simultaneously. Therefore, it is possible that both CRAs rate honestly or negligently. Moreover, it is also possible that both CRAs disagree. These potential outcomes determine the expected payoff for each CRA because they are mutually dependent.

First, we consider the case of both CRAs acting honestly. Therefore, both CRAs report $m = G$ ($m = B$) conditional on a good (bad) signal. Since the default probability of a good investment is zero, the CRAs receive the complete reputation premium of the trusting investors. Moreover, they also receive the reputation premium σ because sophisticated investors realise the qualitative good work. Thus, no matter what kind of investment needs to be rated the payoff is defined as

$$X_{G|g} = X_{B|b} = \phi + \rho. \tag{14}$$

Thus, the expected payoff for an honest CRA (Π_{HH}), on condition that the other CRA is selecting the same action, is

$$\Pi_{HH} = \lambda \cdot X_{G|g} + (1 - \lambda) \cdot X_{B|b} = \phi + \rho. \tag{15}$$

In the second case, once again both CRAs agree regarding the strategies chosen, though they are not telling the truth - either the CRAs act negligently or they inflate. In this scenario the payoffs, however, differ among each other. Initially, imagine the case where a good investment is rated as bad ($m = B$). The result of this negligence is that sophisticated investors punish the CRAs because they are able to detect the incorrect rating. Owing to the fact, however, that both CRAs work incorrectly trusting investors are not able to detect the negligence. Therefore, only the sophisticated investors punish the CRAs. And thus the payment structure is the following

$$X_{B|g} = \phi + \alpha\tau. \tag{16}$$

Now we are considering that a bad investment is simultaneous rated as good by both CRAs. Again, sophisticated investors detect the inflationary rating, however, trusting investors are now depending on whether a default occurs. With a probability of p a default occurs and the CRAs get punished but with the opposite probability the CRAs earn τ:

$$X_{G|b} = \phi + \alpha \cdot (1 - p)\tau. \tag{17}$$

When taking both payment structures together the following expected payoff is determined by:

$$\Pi_{NN} = \phi + (1 - p + \lambda \cdot p) \cdot \alpha\tau. \tag{18}$$

Finally, consider a situation when both CRAs choose conflicting actions. Basically, CRAs should help to solve information asymmetry, however, a disagreement in their ratings creates uncertainty. Whereas sophisticated investors are able to detect the correct rating, trusting investors are completely unsure which CRA is telling the truth. Therefore, we assume that a third CRA will be charged randomly to rate the issuer for a third time and thus acting as a tiebreaker.[13] The tiebreaker function shall reduce market uncertainty, however, it can't be taken for granted that the tiebreaker is automatically rating honestly.

[13] Bongaerts et al. (2012) argue that Fitch often functions as a tiebreaker in cases when Moody's and S&P disagree in their rating reports.

When considering the expected payoff of a CRA that is choosing honesty while the second CRA is choosing negligence the honest CRA definitely receives the fees. Moreover, the sophisticated investors also recognise the honest rating ($G \mid g$ and $B \mid b$) and therefore the CRA earns σ additionally. However, whether the honest CRA earns τ and thus the whole reputation premium depends on the probability z, which determines whether the tiebreaker is choosing honesty, too. In other words, if the tiebreaker is rating negligently the CRA is punished although working carefully and honestly. Therefore, the expected payoff for the honest CRA is determined by

$$X_{G|g} = X_{B|b} = \phi + (1 - \alpha) \cdot \sigma + z \cdot \alpha\tau \tag{19}$$

and thus the expected payoff, on condition that the other CRA is selecting negligent (or inflating), is

$$\Pi_{HN} = \phi + (1 - \alpha) \cdot \sigma + z \cdot \alpha\tau. \tag{20}$$

The CRA that provides negligent or inflationary ratings may be affected positively by the disagreement with the other CRA. Sophisticated investors will punish the negligent CRA certainly. Additionally, the punishment of naive investors depends on the tiebreaker because trusting investors do not have the ability to differentiate between truth and lie. Therefore, they are following the majority. The probability that a tiebreaker is also choosing the negligent/inflating action is determined by $(1 - z)$. Beyond the dependence on the third CRA decision, it is essential that the default of the investment does not occur, otherwise trusting investors punish the respective CRA. Therefore, the expected payoff of the CRA that is choosing negligence is determined by:

$$X_{B|g} = \phi + (1 - z) \cdot \alpha\tau, \tag{21}$$

$$X_{G|b} = \phi + (1 - z) \cdot (1 - p) \cdot \alpha\tau, and \tag{22}$$

$$\Pi_{NH} = \phi + \lambda \cdot (1 - z) \cdot \alpha\tau + (1 - \lambda) \cdot [(1 - z) \cdot (1 - p)\alpha\tau]. \tag{23}$$

So far, the expected payoffs demonstrate the importance of the reputation premium, which can differ significantly between the cases discussed.[14] Table 3 shows that it is possible to investigate whether an equilibrium exists. The proposed framework for CRA market may be adequate to solve the conflict of interests. In every situation of the game a CRA in charge definitely gets paid by the issuer - regardless of whether the rating is good or bad because the central allocation agency monitors the complete rating process.

[14] It is important to mention that reputation becomes relevant after the first period. Therefore, we consider reputation as discounted profits of future periods, as already mentioned above.

Owing to the mediator, reputation costs become a major threat for CRAs. By analysing the game matrix in more detail it becomes obvious that a Nash equilibrium exists.[15] Therefore, rating honestly is the optimal action because it generates the maximum expected payoff.

Table 3: Two-Player Game in Normal Form

CRA2 / **CRA1**	**honest**	**negligent/inflating**
honest	$\phi + \rho$ $\phi + \rho$	$\phi + \lambda \cdot (1 - z) \cdot \alpha\tau$ $+(1 - \lambda) \cdot [(1 - z) \cdot (1 - p)\alpha\tau]$ $\phi + (1 - \alpha) \cdot \sigma + z \cdot \alpha\tau$
negligent/ inflating	$\phi + (1 - \alpha) \cdot \sigma + z \cdot \alpha\tau$ $\phi + \lambda \cdot (1 - z) \cdot \alpha\tau$ $+(1 - \lambda) \cdot [(1 - z) \cdot (1 - p)\alpha\tau]$	$\phi + (1 - p + \lambda \cdot p) \cdot \alpha\tau$ $\phi + (1 - p + \lambda \cdot p) \cdot \alpha\tau$

In most cases if one CRA is choosing to rate negligently the optimal reaction for the other CRA is to be honest. Under certain circumstances, however, a second Nash equilibrium may occur. The most relevant variables to be examined thoroughly are α (the share of trusting investors in the market) and z (the probability that a third CRA is selecting honesty). Skreta and Veldkamp (2009) claim that a small share of sophisticated investors negatively affect the rating quality. The respective critical values can be determined as follows:

$$\alpha^{**} = \frac{\sigma}{\sigma + \tau \cdot (1 + \lambda p - p - z)}, \tag{24}$$

$$z^{*} = \frac{(1 - p + \lambda \cdot p) \cdot \alpha\tau - (1 - \alpha) \cdot \sigma}{\alpha\tau}. \tag{25}$$

As long as the probability that a potential third CRA is honest (z) is exceeding the critical value z^* the described game is characterised by having one Nash equilibrium (H, H). In cases when $z \leq z^*$, however, there exist two Nash equilibria (H, H and N, N). On the other hand, in cases when the share of trusting investors does not exceed the critical value ($\alpha < \alpha^{**}$) there exists only one equilibrium (H, H). In other words, the less the number of sophisticated investors participating in the market the more likely is a second equilibrium and thus the incentive to rate negligent.

Moreover, one might ask in which way α and z^* interact with each other. The higher α the higher becomes z^*. This result can be interpreted as follows: if a CRA anticipates that the share of trusting investors in the market is rather large, the uncertainty regarding the expected payoff increases. The uncertainty increases because if the second CRA chooses to rate negligent the probability

[15] Although the presented models are all one-shot games the main results would probably not change by extending the time horizons of the models.

of getting a higher expected payoff when choosing honesty becomes smaller due to the fact that z^* is raising. In other words, if the CRA is anticipating that α is sufficiently high and z is sufficiently low, it becomes rational to differentiate from the strategy to be honest if the second CRA is selecting negligence.

To sum up in cases when the thresholds are not exceeded ($\alpha < \alpha^{**}$; α defines the share of trusting investors) or fallen below ($z > z^*$; z defines the probability that a potential third CRA rates honest) there exists only one equilibrium. This defines the dominant strategy. In this context, two extreme cases may be mentioned briefly. 1) Only sophisticated investors participate in the market ($\alpha = 0$): In such an extreme situation the case of disagreement and thus the opinion of a third CRA is redundant. If one CRA would deviate from the dominant strategy (rate honest) the optimal reaction would always be to rate honest. Therefore, a deviation from the dominant strategy will never be advantageous for a CRA. Thus, in cases when only sophisticated investors participate in the market only one Nash equilibrium occurs. 2) Only trusting investors participate in the market ($\alpha = 1$): The appearance of a second Nash equilibrium becomes more likely, however not certainly. This is as the threshold term in this extreme case z^*_{EC} becomes larger than z^*. Nevertheless, the appearance of a second Nash equilibrium still depends on the realisation of the probability that a potential third CRA rates honest (z). Owing to the reform proposal it is possible to overcome the conflict of interests.

IV.4. Comparison of the Options for an Appropriate Regulation

The game theoretical analyses demonstrates that divergent regulation frameworks result in different payment structures. All payoffs are summarised in Table 4. This overview displays the following results: First, randomly placing orders is preferred to the status quo owing to the increase (decrease) of expected payoffs if a CRA is acting honestly (negligently and inflationary, respectively). Second, by focusing on the scenarios of drawing one or two CRAs it becomes obvious that the expected payoffs increase if a CRA is acting honestly. According to these results we argue that a regulatory framework that places the orders randomly seems to be more adequate to solve the incentive problems of the market.

In this regard, a further question is which alternative of the random rating allocation is more preferable. In cases when only one CRA is drawn we argue that a 'sequential' monopolistic position is generated and this position entails risks. In the following we compare the case of drawing one CRA with random rating allocation of two CRAs. Therefore, we concentrate on the comparison of the critical values α^* and α^{**}.[16] The comparison of these critical values enables

[16] α^* represents the critical value of the scenario when one CRA is randomly drawn, whereas α^{**} represents the critical value for the second scenario.

us to analysis in which scenario the incentive to inflate is more present.[17] The respective critical values can be determined as follows:

$$\alpha^{*} = \frac{\sigma}{\sigma + \tau \cdot (1 + 2\lambda p - 2\lambda - 2p)}, \tag{26}$$

$$\alpha^{**} = \frac{\sigma}{\sigma + \tau \cdot (1 + \lambda p - p - z)}. \tag{27}$$

If we assume that α^{*} equals α^{**} it arises

$$z^{**} = 2\lambda + (1 - \lambda)p. \tag{28}$$

As long as $z > z^{**}$ the critical value of $\alpha^{**} > \alpha^{*}$. This means that in the case of drawing two CRAs the share of trusting investors needs to be higher before the inflationary strategy becomes rational. Therefore, the random rating allocation to two CRAs is advantageous. Moreover, if $z \to 1$ the scenario of drawing two CRAs is always more advantageous.

[17] As argued above, if α is exceeding α^{*} or α^{**} it becomes rational to choose the inflating strategy. This is as too many trusting investors are market participants.

Table 4: Comparison of the expected payoffs for a CRA depending on the regulatory framework

Expected payoff according to the selected action	Regulatory Framework: Status Quo	Regulatory Framework: Drawing one CRA	Regulatory Framework: Drawing two CRAs[a]
honest	$\lambda \cdot (\phi_G + \alpha\tau + (1-\alpha)\sigma)$	$\phi + (1-\alpha)\sigma + \alpha \cdot (\lambda + p - \lambda p)\tau$	$\phi + \rho$
			$\phi + (1-\alpha)\sigma + z \cdot \alpha\tau$
negligent/ inflating	$\phi_G + \alpha \cdot (1 - p + \lambda p)\tau + (1-\alpha)\lambda\sigma$	$\phi + \alpha \cdot (1-\lambda)(1-p)\tau$	$\phi + \lambda \cdot (1-z)\alpha\tau$ $+(1-\lambda) \cdot [(1-z) \cdot (1-p)\alpha\tau]$
			$\phi + (1 - p + \lambda p)\alpha\tau$

a - Note, in the case of randomly drawing two different CRAs the expected payoff is depending on both its own selected action and the selected strategy of the second CRA in charge. Therefore, the first and the third row represent the situation when the second CRA is selecting honesty. Whereas the second and the fourth row denote that the second CRA is acting negligent.

IV.5. Potential Allocation Effects

After discussing possible regulation options the allocation effects may be of interest, which will be briefly and intuitively discussed. An introduction of a new regulation would likely increase the costs in several ways; for example the costs for establishing and maintaining a central allocation agency or the increase in costs for smaller issuers, which would have to pay for two ratings. Owing to the mediator solution, however, we would expect significant allocation improvements, especially in a dynamic manner.

First of all, owing to the incentive to elaborate veridical ratings it is likely that the allocation increases significantly. Ratings provide information for investors and therefore a higher number of veridical ratings should lead to a more efficient allocation of capital. Second, we would expect an increase in confidence of capital markets. This is because the new regulation would reduce the principal agent problem significantly. Confidences in capital markets and in the quality of information, respectively, are two elementary requirements when deciding to invest in a risky asset. Therefore, it can be assumed that the proposed regulation approach would result in an increase of capital released, although the costs for exploitation of information are likely to increase, too. Thus, more risky projects can be realised owing to the fact that more capital is available within the market.

Besides these direct allocation effects, the proposed regulation approach is likely to affect the market differently and improve efficiency. Depending on the exact organisation of the rating process, it enables smaller CRAs to enter the market. This would probably lead to the destruction of the oligopoly. We also expect a the reduction of the two incentive problems.

Alongside the advantages of the discussed approach there are negative aspects, too. First, the flow of information between the issuer and the CRA is distorted, since there is no direct contact between them. According to the regulatory capture theory it second might be possible that the regulator tries to increase its importance and maintain it in the long run. In other words, once a new regulation is created it could become increasingly difficult to abolish the rule in future, when the desired effects have been reached. Moreover, the proposal seems to be inappropriate to solve the issue of the focal points. As mentioned above, CRAs are of importance for market participants because they justify herd behaviour and help to coordinate the investors' beliefs (Boot et al., 2006).

V. Policy Implications

The theoretical analysis suggests the establishment of a pooling-solution in the shape of a central allocation agency for the purpose of solving the conflict of interests. This allocation agency could be a European institution, thereby being

independent from politics in order to build up credibility in financial markets. The main assignment of the central allocation agency is the organisation of the rating market, whereas consisting regulation and monitoring still remains in the hands of the European Securities and Market Authority (ESMA).

As said above, a central allocation agency (in the shape of a mediator) is appropriate to cut the direct contractual relationships and thus the conflict of interests. The potential issuer is not allowed to contact the CRA directly and vice versa. Therefore, the issuer has to commission the mediator in order to start the rating process. The issuer has to communicate the requested contractual duration[18] as well as a range of fees that the issuer is willing to pay. In addition, the issuer has to provide all relevant information about the products that shall be rated. This is not trivial, since the information cannot be provided in direct contact between issuer and rating agency. As under the status quo, the issuer is stilling paying for its ratings, however Mathis et al. (2009) call this payment structure as platform-based. As demonstrated above, the issuer-paid business model in connection with a mediator solution is appropriate to reduce conflict of interests.

Subsequently, the central allocation agency contacts the pool of CRAs. A CRA automatically becomes a participant of the CRA-pool once it has been registered and certified by the ESMA.[19] The mediator provides information about the issuer as well as the extend of the commission. Therefore, each CRA obtains the opportunity of a free choice whether the CRA wants to participate in the ongoing rating process. This is important because of two different aspects. First, smaller CRAs might have limited resources and thus might not be able to serve appropriate quality for further issuers. Secondly, one takes into consideration that also niche providers are in the market and they might not be able or willing to serve all market segments. When a CRA decides to participate in the following process they also have to submit a financial offer.

The central allocation office possesses information about the demand side's willingness to pay and the supply side's financial requirements, among others. Assume that there is no intersection regarding the financial aspects of the contract. Therefore, the central allocation agency enables each participant anonymously to renew the respective offers. It is conceivable to repeat this procedure, if necessary. Two results are possible: First, no intersection has arisen or less than three CRAs are within the bandwidth. In this case the regulatory requirements

[18] According to the adopted European Commission regulations, however, the maximum contract duration is three years.

[19] Every CRA is allowed to apply at the ESMA. The ESMA is obliged to assess the completeness of the application and whether the compliance of the regulations determined by European Parliament and Council are fulfilled. At the time this paper was written "16 CRAs have been registered and a Japanese CRA has been certified" by the ESMA (2012, p. 5). In cases when the application is rejected the ESMA is obliged to provide a detailed report. This application process ensures transparency.

are not fulfilled and therefore the rating process stops. In this case the issuer obtains no rating. Second, an intersection has arisen and the offers of at least three different CRAs are within the bandwidth. Then the rating process can be continued and each CRA, which is still too expensive, will be excluded. If all requirements of the European Parliament and Council are fulfilled by the CRAs the final pool of CRAs, for the respective case, is given.

Finally, the central allocation agency raffles two CRAs. It is conceivable that CRAs with higher reputation obtain a higher possibility to be drawn.[20] This is due to increase the importance of high reputation and thus increase the incentive to elaborate sound ratings.[21] The drawn CRAs are commissioned to rate the issuer. The allocation, however, is anonymous and the disclosure, which CRAs obtained the commission, takes place when the mediator issues both ratings at the same time and therefore solves the covered game. This proceeding is advantageous because a positive correlated rating tendency between the respective CRAs can be excluded. Moreover, each CRA has to provide all relevant information, such as methodology and used parameters, to the central allocation office. This bundle of information is necessary for the case when investors take legal action against CRAs if the rating contains intentionally or grossly negligent mistakes.[22]

All in all, this policy option for the European rating market has a number of different positive aspects. Basically the approach is easy to adopt and can be harmonised with the consisting regulations of the European Union. Moreover, the proposal is appropriate to solve critical characteristics of the consisting credit rating market. Most importantly, this approach is appropriate to solve the principal agent problem. The mediator solution allows to maintain the basic principles of the 'issuer-pays' business model, however it is now based on platform (Mathis et al., 2009). The suggested approach is able to break the market power of the trio owing to the fact that the issuer is not allowed to select a CRA independently.

In addition, reputation seems to be very important to be a successful market participant. Owing to transparency of the ESMA requirements both qualitative standards are created and the reputation of smaller CRAs could be raised, which could increases market acceptance. The transparency of requirements generates another advantage - reduction of barriers of entry. One might argue that a

[20] Imagine the pool of accredited CRAs as an urn. New incumbents and CRAs with low reputation obtain one ball, whereas, for example, a CRA with high reputation obtains three balls. For such an allocation the mediator sets the conditions.

[21] It would be also possible to suspend CRAs if reckless ratings accumulate significantly.

[22] One might argue that the liability risk would demise to the central allocation office due to the fact that they possess all information. In this context the main task of the central allocation office, however, is only the storage of information and not the evaluation of the rating. Therefore, the central allocation office would provide the information in case of a lawsuit.

registration as condition to enter the market would increase the barriers of entry. This might be correct in the first place, however, the application of a lottery of orders will finally reduce barriers of entry. This is due to the fact that a lottery drawn increases the probability of gaining market share. Moreover, one should keep in mind that already 16 CRAs have been registered and certified by the ESMA.[23]

VI. Conclusion

In this paper, we provide an option for an appropriate CRA regulation. We mainly address the question of whether it is possible to change the market structure and decrease the market's incentive problems, whereas the principle of the 'issuer-pays' model remains unchanged. To support our regulatory policy option we develop a game theoretical approach. Our analysis comprises three different scenarios: (i) the status quo, (ii) random rating allocation to one CRA and (iii) random rating allocation to two CRAs.

Moreover, we evaluate the current proposal of the European Commission. Although many aspects discussed within this proposal are important, the conflict of interests as the main issue remains unaddressed. Therefore, we argue that European policymakers should reconsider their proposal. The restructuring of the CRA market, as this paper provides options, seems to be necessary in order to counter market problems.

Our analysis shows that a restructuring of the CRA market by establishing a mediator could help to solve the incentive problems. This is because in our proposed option the central allocation office is able the break critical contractual relationships. The allocation office is responsible for awarding the contracts based on a lottery drawing. Moreover, the game theoretical analysis demonstrates that rating honestly is a Nash equilibrium. Although, it cannot be excluded that a second equilibrium occurs (namely to rate inflationary), the probability for this outcome decreases significantly and mainly depends on the share of sophisticated investors. Moreover, the options provided in this paper could be appropriate to enable smaller CRAs or new incumbents to increase

[23] At this point, one should mention the importance of minimum capital requirements. Since the Basel II Accord entered into force capital requirements for financial institutions increased significantly. In order to assess the risk adequately financial institutions are allowed to use nationally approved CRAs. For example, the German Federal Financial Supervisory Authority (BaFin) recognised seven CRAs. According to the authors' opinion, there are two main reasons for this discrepancy. 1.) The CRAs, which are registered by the ESMA, partly offer different rating products. Thus, not every rating product is appropriate for risk weighting. 2.) In Germany, for example, to become approved by the BaFin a potential CRA has to name the financial institutions which are interested in using the respective rating for their individual risk weighting. With regard to the proposed approach one should consider a simplification of the national approval process.

their reputation as well as their market share. These aspects would affect the market competition positively.

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